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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/583,516

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EXAMINER

SMITH, NICHOLAS A

ART UNIT

PAPER NUMBER

1795

MAIL DATE

DELIVERY MODE

03/11/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/583,516	Applicant(s) WANG ET AL.	
	Examiner NICHOLAS A. SMITH	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 June 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 and 45-57 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 and 45-57 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Status of Claims

1. Claims 1-7 and 45-57 are ready for examination.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-2, 7 and 45-57 are rejected under 35 U.S.C. 102(b) as being anticipated by Wang (US 6,447,668 B1).
4. In regards to claim(s) 1 and 7, Wang discloses a method and a system capable of controlling removal rate uniformity during an electropolishing process in integrated circuit fabrication on a wafer (Figs. 58, 60; col. 43, lines 17-28, col. 44, lines 57-65, claim 7) comprising applying a stream of electrolyte to the wafer using a nozzle positioned adjacent to the wafer with a gap and adjusting said gap to adjust the removal rate profile applied by the nozzle. It is noted that in Wang, claim 8 discloses a wafer chuck configured to translate the wafer relative to nozzle, Figure 58 discloses the z-direction (gap direction) and that col. 43, lines 17-28 discloses that such translation enhances uniformity.
5. In regards to claim(s) 2, Wang discloses a gap and a nozzle meeting the claimed dimensions (Figs. 58, 60; col. 43, lines 17-28, col. 44, lines 57-65, claim 7; column 37,

lines 39-65). Since Wang uses the same method with the same dimension, the claimed removal rate profile would be inherent to Wang's process.

6. In regards to claim(s) 45-47, Wang discloses a system as stated above in paragraph 4, and further discloses a system with a guide rod and motor for rotating the wafer chuck, and is capable of radial translation of the wafer or nozzle (claim 8, Figs. 54A, 54B, 58, 60) Wherein Wang does not explicitly disclose a method of changing the gap at different radial locations, Wang discloses an apparatus capable of changing the gap at different radial locations and thus is configured to perform the claimed changing of the gap at different radial locations. See MPEP 2114.

7. Claim 7, 45, 50 and 55 are rejected under 35 U.S.C. 102(b) as being anticipated by Corbin, Jr. et al. (US 5,865,984 A).

8. Corbin, Jr. et al. (Figs. 1-5, column 2, line 61 to column 3, line 57) discloses a system comprising a wafer chuck configured to hold a wafer during the electropolishing process, a nozzle configured to apply a stream of electrolyte to the wafer and is positioned adjacent to the wafer with a gap between the nozzle and the wafer. While Corbin, Jr. et al. do not explicitly disclose adjusting the gap during electropolishing, since Corbin, Jr. et al. is capable of adjusting the gap, their systems are configured to control the removal rate uniformity because their systems are capable of adjusting the gap between the nozzle and the wafer. See MPEP 2114.

9. Claims 7 is rejected under 35 U.S.C. 102(b) as being anticipated by Datta et al. (US 6,103,096 A).

10. Datta et al. (Figure 2, column 3, line 25 to column 4, line 14) discloses a system

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comprising a wafer chuck configured to hold a wafer during the electropolishing process, a nozzle configured to apply a stream of electrolyte to the wafer and is positioned adjacent to the wafer with a gap between the nozzle and the wafer. While Datta et al. do not explicitly disclose adjusting the gap during electropolishing, since Datta et al. is capable of adjusting the gap, their systems are configured to control the removal rate uniformity because their systems are capable of adjusting the gap between the nozzle and the wafer. See MPEP 2114.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 3-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang.

13. In regards to claim(s) 3, Wang discloses a method of controlling removal rate uniformity as stated above in paragraph 4. Wang discloses a method of changing the relative position of wafer to nozzle to improve uniformity (col. 43, lines 22-28; Figure 58). However, Wang does not explicitly disclose changing the gap between nozzle and wafer while changing the radial position of the nozzle. Wang does teach changing the height of nozzles (Fig. 20A; col. 31, lines 26-36; **109**, annular space between **109** and **107**; **107** and **105**; **105** and **103**; **103** and **101**) to adjust the flow pattern of the electrolyte. It would have been obvious to one of ordinary skill in the art to modify

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Wang's method of controlling removal rate uniformity by adjust radial position of the nozzle with Wang's method of adjusting nozzle to wafer gap distance in order to adjust the flow pattern of electrolyte (Wang, col. 31, lines 26-36).

14. In regards to claim(s) 4-6, Wang discloses moving the nozzle center to edge or edge to center (col. 47, lines 30-39; Fig. 63A; col. 29, lines 9-12). As stated above, Wang's method in view of Wang's method would result in adjusting gap with radial location, but only would generically include both increasing and decreasing of gap with respect to radial position; it would have been obvious to one of ordinary skill in the art to select either increasing or decreasing the gap with incremental changes in radial position in that there is a limited selection of possibilities.

Conclusion

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to NICHOLAS A. SMITH whose telephone number is (571)272-8760. The examiner can normally be reached on 8:30 AM to 5:00 PM, Monday through Friday.

16. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Susy Tsang-Foster can be reached on (571)-272-1293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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17. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Harry D Wilkins, III/
Primary Examiner, Art Unit 1795

NAS